

# INTAGLIO

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The material for this booklet
has been prepared
for the Youth and Recreation Branch
by Jo Rothfels

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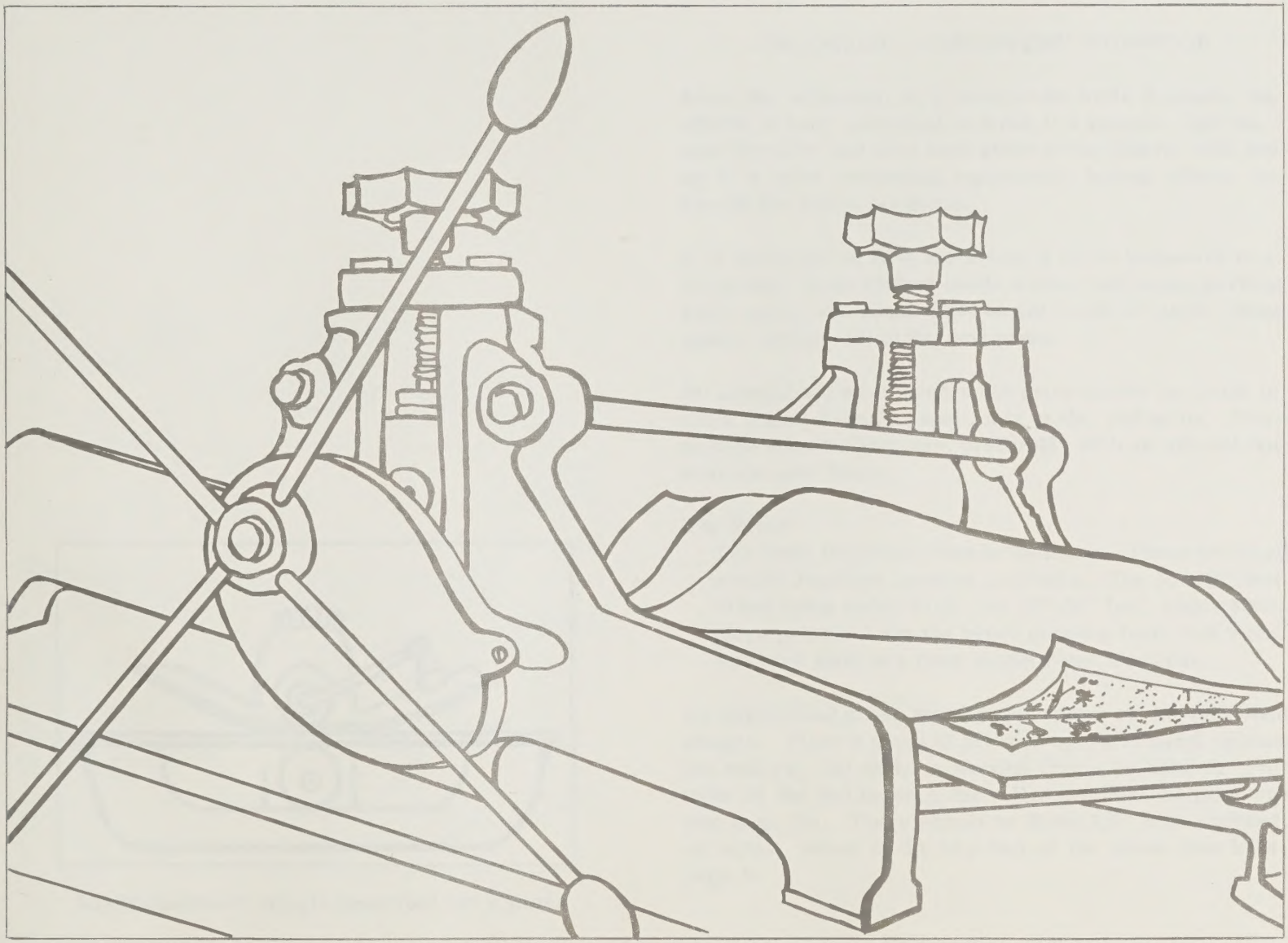
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## INTRODUCTION

Intaglio means "to incise" and is a term used in printmaking to describe a print pulled from a metal plate on which lines or depressions have been engraved or bitten into the metal with tools or acid.

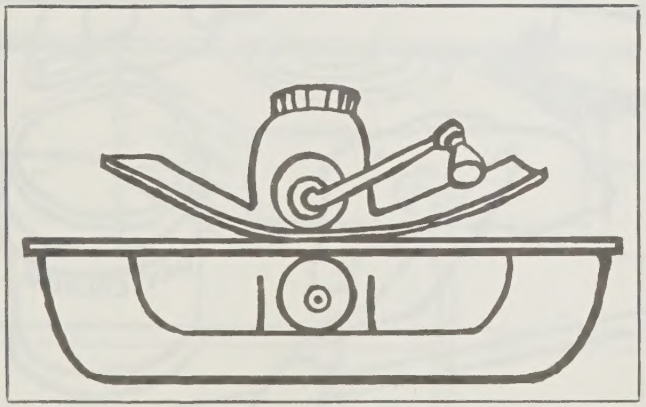
Man has incised bone, stone, and metal from the beginning of history, but it is only since the development of the printing press that he has thought to rub ink into the incisions and print. Although there were many great etchers and engravers in the early days, Rembrandt and Dürer for instance, intaglio gradually degenerated into a process of reproducing paintings, culminating in the "steel engravings" of the nineteenth century.

During this time there developed a mystique that clouded the basic simplicity of the medium. Fortunately, intaglio caught the interest of painters at the turn of the century and in the experimenting of those years, was freed from the old traditions. Intaglio has now come into its own as a printmaking method and has made a place for itself in the smallest studio.



Bench press with plate and print on bed under felts





An old-fashioned mangle converted into a press

## ORGANIZING A BEGINNERS' WORKSHOP

Since the workshop is a community while it exists, the efforts of each individual to make it a success, and the consideration and help each gives to the others, will add up to a most rewarding experience, having effects far beyond the initial occasion.

It is better not to have more than a dozen beginners in a workshop. Each student needs a chair and some working table space, and areas must be set aside for acids, damp paper, inking, hot plate, and press.

No special wiring is needed but there should be a sink to rinse trays, dampen paper, mix acids, and so on. Ventilation must be adequate, preferably with an exhaust fan near the acid trays.

### The Press

The most important item is the press. There are small geared Japanese presses available. The 10"x18" bed press costs under $100, the 13"x26" bed, under $200. More practical are the bench presses from New York, and very good is a floor model from Montreal.

An improvised press may be made from an old-fashioned mangle. Place a piece of plywood or sheet metal between the rollers, and make a wooden frame to hold it. Put felts on the bed between the rollers, adjust the pressure (see page 24). There should be three 1/8" felts pressed, or better, woven to fit the bed of the press (see felts page 4).

Trays

glass, acid-resistant plastic or rubber, (from a photographer's or a photo-engraver's supply) for the acid,
a large tray for soaking paper.

Acids

nitric acid, from a scientific supply firm,
iron perchloride from a photo-engraver's,
bottles to hold the solutions should have acid-resistant tops, also from a scientific supplier,
enough acid must be prepared to cover the plate in the tray (about $\frac{1}{4}$").

For the acid bath

feathers or pipe cleaners to brush away bubbles in the bath,
glass measuring cup,
an old stainless steel fork to lift the plate in the bath,
glass or plastic funnel for pouring the acid back into the jars.

Paper

thick printing paper which dries flat and is fairly inexpensive (Nu-Tex),
a dozen or so large, white desk blotters (19"x24") for drying soaked paper,
a piece of oilcloth is handy for rubbing the top of the blotters to press out the water from the wet paper between the blotters.

For mixing the ink

plate glass or marble slab for mixing inks,



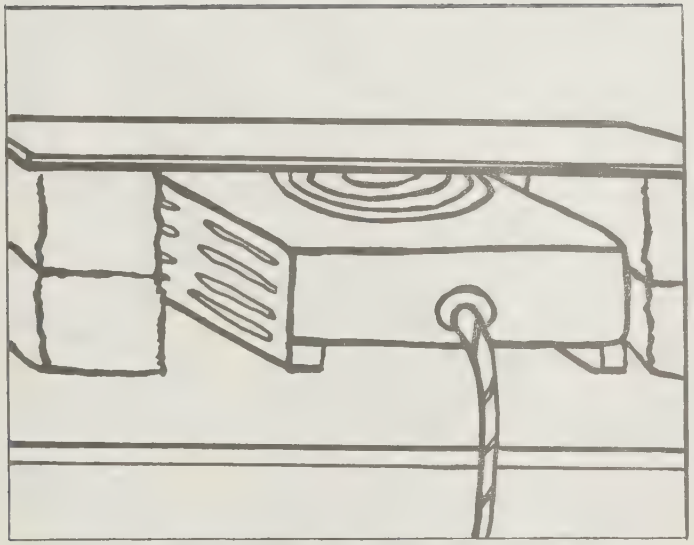

Printing slab with inks, dauber and tarlatan

For mixing the inks cont'd

a felt dauber made of rolled felt trimmed at the ends,
a spatula or narrow putty knife,
solvent (Varsol), alcohol, or methyl hydrate, linseed oil, heavy plate oil,
an old pair of gloves to keep hands clean,
tarlatan for wiping plate, obtained from dry goods shop or ballet supply, (netting and other softer materials are not suitable),
copperplate black etching ink, coloured etching ink, and dry pigments, printer's ink for relief printing, (sticky litho and printing inks are not satisfactory for intaglio printing, but may be used rolled on the plate surface).

Hot plate

a piece of sheet iron supported on bricks over the plate to make a stove.



Stove with sheet iron supported by bricks

Tools and plate materials

metal file and scraper from the hardware store,
burin and burnisher from a jeweller's or engraver's supply,
4/0 emery polishing paper and metalite paper from a metallurgical supply,
jeweller's rouge from jeweller's supply,
copper and zinc plates from the photo-engraver's, (small sizes about 7"x10" or 9"x12" to begin with),
hard and soft grounds from the etcher's supply,
lump resin, beeswax, benzine, for dissolving home-made ground,
whiting or calcium carbonate from the drug store,
asphaltum varnish, asphaltum from photo-engraver's,

Tools and plate materials cont'd
vaseline for soft ground,
silk and other fabrics such as nylon stockings for resin bags,
a needle taped on a pencil for drawing into the ground,
an etching needle,
other tools of various thicknesses for different lines,
soft pastel,
candles for smoking ground, tallow candle from etcher's supply,
a matt-knife for cutting stencils,
a 24" ruler for measuring paper,
lots of paper towels and newspapers,
spatulas, palette knives.

Felts
three 1/8" pressed or woven felts cut to fit the bed of the press.

Students should bring their own plates, paper, ink, and tools, since these are up to individual choice, but many items in common use may be provided for the group.

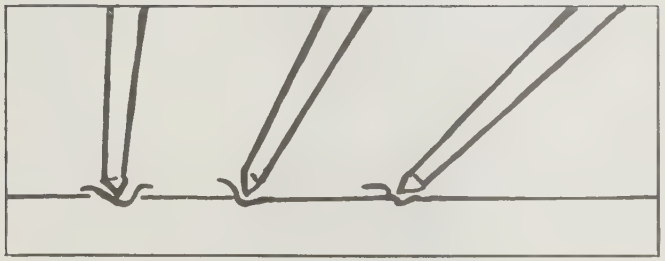
## ENGRAVING

The oldest method of incising metal is engraving, and it is done with a tool called a burin. Properly sharpened and used, the burin cuts cleanly through the metal making lines that print with a special quality of crispness.

For engraving one needs a polished metal plate, preferably copper or zinc, but aluminium or plexiglass can be used.



How engraving tool is held in hand



Strength of line varies with angle of dry point tool; last line is too weak to print

A burin (sizes 7 to 10 are most practical), scraper, and burnisher are used to engrave the metal.

Sketch out with wax crayon the elements of the design onto the metal, remembering that the resulting print will be a mirror image of your drawing. Face the body in the direction that one is cutting. Place the burin handle in the palm of the hand, with the little finger holding it securely and the two middle fingers resting on the side of the burin. Index fingertip and thumb slide on the plate while cutting. Cut from the shoulder keeping the elbow on the table, and move the plate as the cut is made to follow the sketch. It helps to have a slick surface under the plate to ease this manipulation. After the line has been made, cut off the resulting curl of metal with the scraper. This must be done cleanly with every cut, otherwise the ragged metal will hold the ink and make a muddy print. An engraved plate is usually wiped cleaner than bitten line, using whiting for the final hand wipe. (See Printing the Plate page 16.) This makes a print of great contrast and clarity of line.

For a detailed description of the engraving techniques read "Printmaking", Gabor Peterdi (Macmillan, New York).

## MACHINE ENGRAVING

Various drills with interchangeable bits may be used for many different linear and textural effects in the print. The entire image may be created this way or it may be combined with burin engraving or bitten line for more preciseness.

The effects of the drill are rather like dry point, a sensitive line with a burr that catches the ink. This lasts through quite a few printings but the plate may be hardened commercially, like dry point. The drill must be used with safety precautions, particularly goggles and a mask. Apart from this it is a very valuable addition to the etcher's workshop and greatly enlarges the scope of his work.

Drill can also be used for grinding out unwanted lines or areas. It's excellent for burnishing and polishing out areas or the whole plate before work resumes.

## DRY POINT

Dry point, like engraving does not require the use of acid. A metal scriber or a dry point tool is drawn firmly through the metal raising a burr, and it is this burr which holds the ink, resulting in a line that prints with a velvety richness. It should be rolled through the press under less pressure, and with soft felts.

The thickness of the line may be varied by changing the angle of the dry point tool. Too shallow an angle in relation to the plate however, will produce a weak line. Since it is a raised burr of soft metal that holds the ink and makes the print, it will gradually wear away, and often only a few prints may be made from a plate. However a dry point plate may be hardened by electrolysis. To have this done by a professional is not too expensive and many more prints may be pulled from the hardened plate. If this is not done, it is preferable to ink and then



Dry point showing drag of the ink

carefully hand wipe the plate. Always dispose of the surplus ink from dry point printing because it picks up small pieces of metal which scratch the plates.

## BITTEN LINE

When lines or areas are made in a waxy coating on the metal, and an acid bath is allowed to bite into the metal where the protecting cover has been disturbed, the process is called etching. Etching has infinite variations depending on the metal or acid used, type of ground or stop out, widths of lines or areas bitten, length of time in the acid, and so on. It may result in a simple black and white line print, or become as complex as a multi-colour plate or plates with the size and subtlety of a painting. Here, however we will describe only the simplest processes, referring you to the bibliography for more thorough reading.

For beginning, a zinc plate between 16 and 20 gauge and not too large, around 9"x12", is best. One metal only should be used in the workshop at the start; if zinc and copper are accidentally placed in the same bath a chemical reaction called electrolysis lifts the ground and unfortunately ruins the plate. Zinc is the cheapest and may be had from the photo-engraver's supply already coated on the back.

The plate may be rubbed with metal polish (Brasso) and then cleaned with alcohol, or simply household cleaner and water, until the water no longer covers the surface of the plate but pulls away in puddles. Ground lifts from a dirty plate in the acid bath.

Place the plate on the hot-plate stove, and heat until warm. The ground is then applied. This will resist the action of the acid, when the plate is immersed in the acid bath.

If hard ground dissolved in benzine is used, brush it thinly over the plate, covering it completely. Continue brushing until the coating is even. Do not let the plate become so hot that the hard ground smokes, or it will flake off in the acid bath. Remove from the stove and cool.

To apply solid hard ground, melt it on the warm plate first, and then roll on with a rubber roller. At the correct temperature it will roll on evenly. If it's too cold it pulls off; if it's too hot it liquefies.

The ground on the plate may now be smoked if a dark firm surface is desired. This makes the drawing easier to see, and helps the ground to adhere to the metal. Hold the plate, ground side down, in a candle flame being careful not to let the wick scratch the ground. Move the flame back and forth melting the ground but being careful not to burn it. The carbon from the candle is incorporated into the wax, forming a dark firm surface. A tallow candle gives darker smoke but an ordinary one will do quite well.

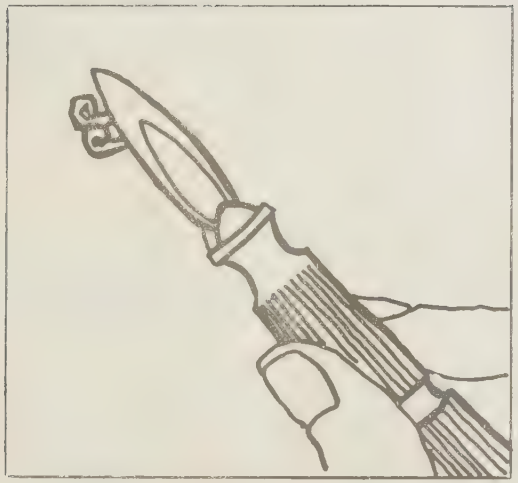
The plate is now ready for the drawing, which may be roughly laid out with soft white pastel. For more precision, the sketch may be made to size on paper, rubbed on the back with pastel, and then traced onto the plate with a soft pencil. However, ideally, one should have enough drawing experience to work directly on the grounded plate with an etching needle. Remember again that the print is a mirror image of this drawing.



Smoking the ground with a tallow taper.



9/9 Toads



Using the scraper

If not satisfied with the drawing, place the plate on the warm stove and melt the ground entirely or paint areas to be corrected with asphaltum varnish stop-out, or shellac. However traces of the drawing will remain on the metal if the needle was used too heavily, and since these will print, they must be erased later with the scraper and burnisher.

Even after the drawing has been etched, corrections may be made on the plate. Holding one facet of the scraper almost flat on the plate, move the scraper along etched line to be erased, lightly at first so it doesn't dig into the metal causing ridges that will print. Work smoothly, removing the copper in neat curls, making a wide shallow depression. Of course this is difficult to do with deeply etched lines. One may experiment with epoxy, (liquitex moulding paste), and other new materials to fill the unwanted lines.

Smooth any small pits with the burnisher, pressing evenly. After this, rub the entire corrected area with metalite paper, removing the remaining pits and scratches. Polish with 4/0 emery paper, and finally with jeweller's rouge, until the plate prints cleanly. Even a slight roughness on the metal will print grey and detract from one's idea. All this polishing is laborious, but will save a plate that may otherwise be ruined.

Going back to drawing on the plate, many ordinary tools may be used — nails, for instance, or a needle taped to a pencil, the point having been ground down so that it travels over the metal. There are also special etching needles with smooth points

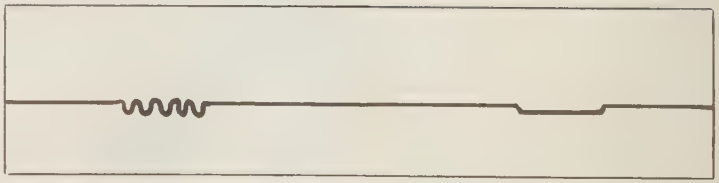
Heavy cross-hatching will etch more quickly in the acid than a few sparse lines. To make a thick black line, a number of lines should be drawn close together. The ridges between them will hold the ink, whereas a single wide line will etch shallowly, and not hold enough to print black ink. This effect, of course, may be used when a thick, soft grey line is wanted.

After the drawing has been made, the plate is placed in an acid bath and etched. A nitric acid bath, for zinc, one part acid to nine parts water, is fast and simple for a workshop. Iron perchloride, bought in solution and used for copper only, is good because no fumes are produced, but it takes much longer to bite. The plate is immersed in it, drawing side down, on plasticine feet, so that the resulting sediment will fall to the bottom and not clog the lines.

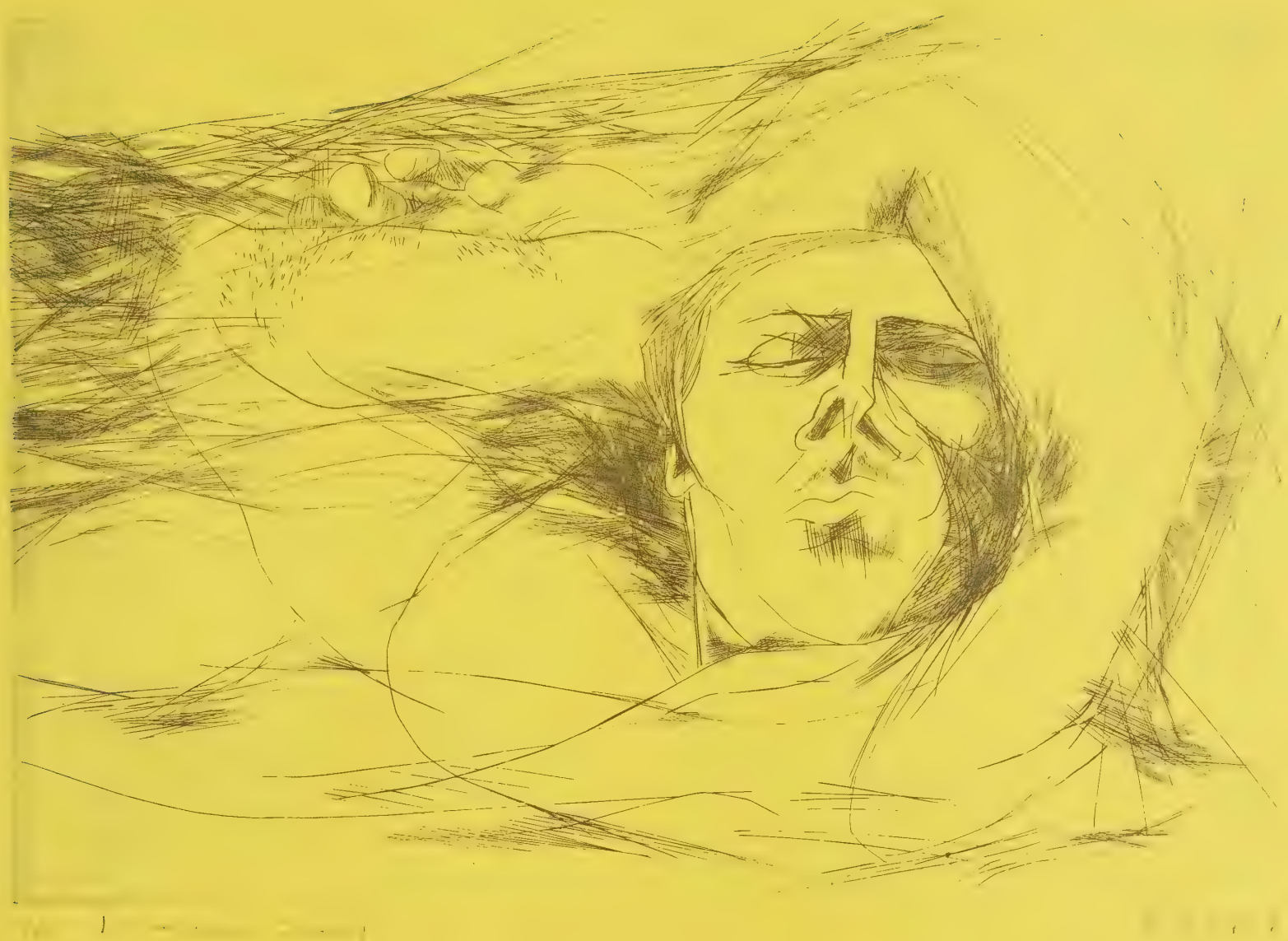
For simplicity, we discuss here only zinc plates and nitric acid.

First coat the back of the plate (if uncoated) with stop-out made from asphaltum varnish, shellac or resin dissolved in alcohol, and let dry thoroughly.

Place the plate in the acid bath so it is covered by about $\frac{1}{4}$" of acid. As biting begins, bubbles will form in the lines. These must be brushed away with a feather or an uneven bite will occur. If no bubbles form in some areas the ground has not been removed sufficiently for the acid to attack the metal. Remove plate and open lines again. The length of time the plate is left in the bath varies with acid strength, weather, temperature, and many other factors.



Cross section of bitten line — ridges hold ink





Heavily worked area bites faster

The only reliable way to tell if the line is opened enough to print well is to feel into it with a needle. If the needle holds securely in the line. the line will print.

## TEST PLATES

A test plate will give some idea of what to expect. Draw different types of lines and etch them for varied times in the acid bath. Stop out some bitten areas with asphaltum varnish at intervals, drying the varnish before immersing in the acid. When the test plate is printed, compare the feel of the lines with the lines being etched on your plate. Too deeply bitten a line will not print because the ink will remain in the depression, and the resulting line will be white. This effect may be used deliberately, of course. Try the effect on the test plate, etching some parts almost through to the back.

For richer blacks, or more texture in the print, the plate may be bitten several times, the ground being removed with Varsol and then re-applied. The print from each immersion is called a state and given a number: 1st state, 2nd state. and so on. After the first print or proof, ground is applied to the plate again without smoking. More lines are made and bitten. Then a proof is pulled of the next state. Or after the first bite, more lines may be made in the ground, which is not removed, and the plate re-bitten. If this is done several times the first lines will print very black and the last very light. One may even draw on the plate at intervals while it is immersed in acid.

## AQUATINT

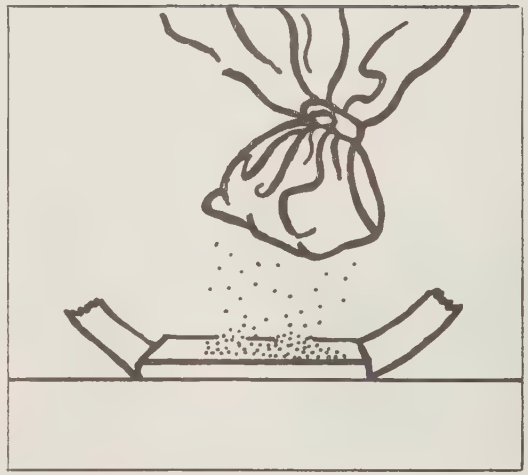
Aquatint is a rather meaningless term. It refers to the wash-drawing effect of a print made from a plate dusted with resin. This is fused to the plate with heat, and immersed in an acid bath. The acid bites between the tiny particles of resin, creating pits which hold the ink, printing areas from grey to black, depending on the depth of the bite.

Lump resin is crushed, placed on an 8" square of fine silk, or cotton, or a piece of doubled nylon stocking, with string which is then tied to make a bag. Several bags of different materials may be used making a coarse or fine dust.

Place a perfectly clean plate on a paper towel larger than the plate. Shake the bag over it making an even, fairly dense layer of dust all over the plate covering about 60% of the surface.

Lift the plate with the paper towel and place very gently on the stove being careful not to disturb the dust. Remove the towel gently. The stove must be hot enough to melt the resin grains slowly, but not so hot that they run together quickly making an impenetrable coating. When each resin grain is transparent and just beginning to "star" out remove the plate. If the resin is not melted enough, it lifts off in the acid. If too hot it runs together and the acid cannot attack the metal.

After melting the dust, back the plate with stop-out and dry thoroughly. Before biting, the areas to remain white



Applying resin dust to plate

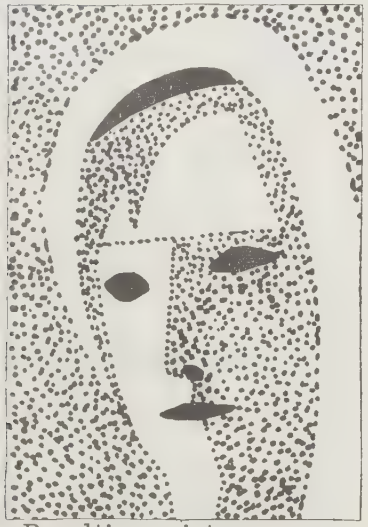


1st stop-out on the plate

(areas to print white are painted black)



2nd stop-out on plate



Resulting print on paper

are stopped out by painting on asphaltum varnish or shellac with a brush. This should be done fairly meticulously to keep a clean edge. Again it is best to make a test plate with several successive bites and stoppings-out. The plate is bitten for say, 4 minutes, then 8, 16, and 32 minutes and so on, beginning with any interval desired, and stopping out with varnish between bites so that when printed, there will be several tones from white to black. Needless to say, the stop-out should be thoroughly dry before it is immersed in acid. When biting is complete remove the asphaltum varnish with Varsol, the resin dust with alcohol, and then make a print. Aquatint gives depth to the plate when it is used with line. The lines may be etched first and aquatint made later, or vice versa. It may be used alone for a wash-drawing effect or scraped and burnished in the manner of mezzotint, creating a modelled surface.

Interesting textures may also be introduced on the plate by sprinkling with different size lumps of resin and melting on the plate. It is not possible to reproduce an example of aquatint here, because of the limitations of the method used to print this booklet.

## RELIEF ETCHING

Very briefly, relief etching is made by painting a design or pattern on the metal with stop-out, and etching this, creating areas that are lower than others. This may be done through several stages making a varied and attractive surface. The plate may be smoothed and worked with the scraper, almost like relief sculpture. Inks are then

rubbed into the hollows, rolled over the surface with rollers of different degrees of hardness. Softer rollers deposit ink on the lower layers, hard rubber rollers on the top layer. It is best, however, to print deep relief on a heavy press, possibly with paper laminated in two or more layers.

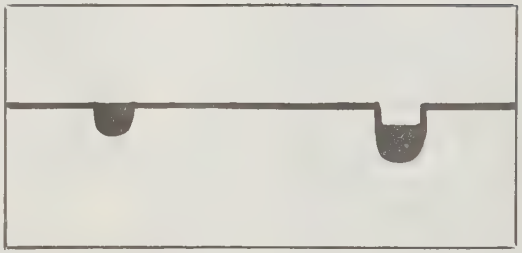
Experiment with building up a surface with plastics, liquitex moulding paste, and other materials and printing from this, or indenting the metal with hammer and nails creating varied textures. One may draw on the clean metal with varnish, biting fairly lightly, the etched area printing grey. This may be a basis for further line and aquatint work on the plate. The possibilities of building up or into the plate are endless.

## SOFT GROUND ETCHING

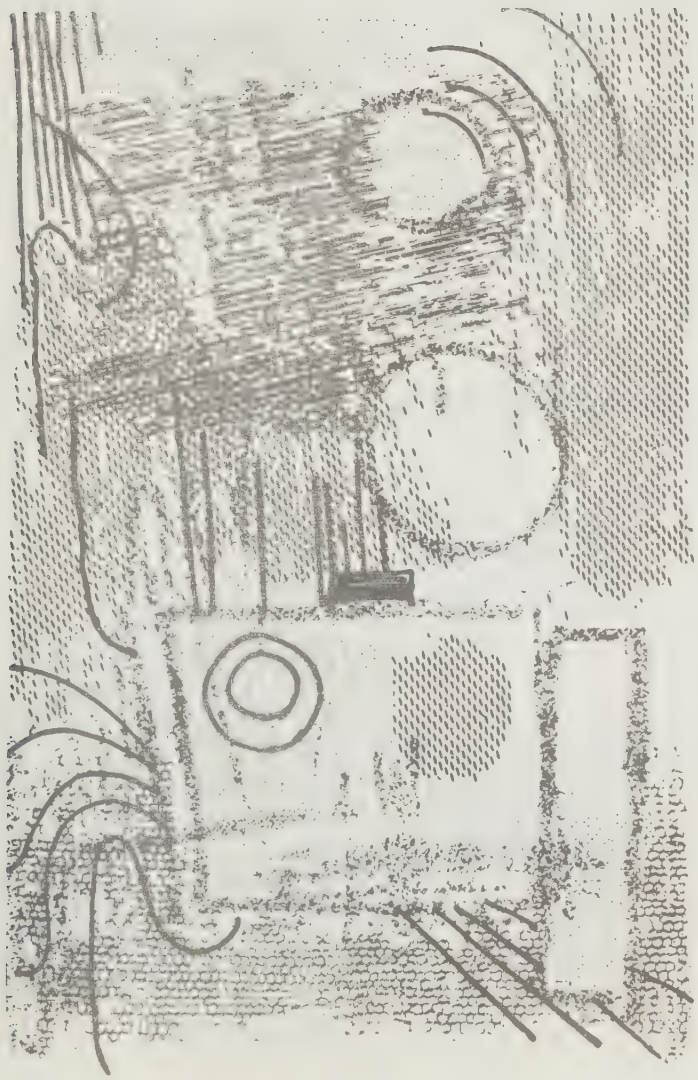
Soft ground is simply two parts hard ground mixed with one part vaseline or axle grease and applied, not too thickly, on a warm plate. Afterwards the plate is coated on the back as usual.

Soft ground is more sensitive than hard ground, and is used primarily for textured and delicate effects to incorporate into the pictorial image.

It can be used to make a print resembling a soft, crayon drawing. This is done by placing a piece of tissue, rice or other paper on the soft ground, and drawing on this with a hard pencil or other tool. The ground adheres to the paper where the pencil marks are, and when the plate



Ink is caught in the deeply etched line



is bitten in the acid, a soft crayon-like line results. This may be varied by using different tools and thicknesses of paper. Be careful not to smudge the delicate surface of the ground with fingerprints. Stop out small errors before biting the plate.

To make textures on a plate, lace, burlap, textured fabrics of all sorts, sandpaper, leaves, string, fingerprints, and many other things may be used. Place the textured material on the plate, which is on the bed of the press, with the soft ground side up. Remove a felt from the press, place a piece of waxed paper over the plate, and run through the press. If the ground was applied too thickly, the texture will be smudged. Areas may then be stopped out and bitten, or bitten first and then stopped out, to make a richer depth. Or successive textures may be pressed on the ground either before biting, or with immersion in the acid in between.

But the texture must not be a decorative thing in itself to hide a shaky drawing. It must be part of the visual conception of the artist, and used in this manner, adds greatly to the richness and depth of the print.

Soft ground may be substituted for hard ground whenever a print of less definition is desired. It may be worked in the same way, with the etching needles and other tools, and textures pressed in at the same time. However it is better to do the line work first, if this is to be bitten separately, since it is difficult to make crisp lines on an already bitten textured surface.

## PRINTING THE PLATE

After lines or depressions are made in the plate, the ink must be rubbed into these, then wiped off the surface, and the whole run through under the felts in an etching press, with dampened paper. The ink on the plate is transferred to the paper and a print is made.

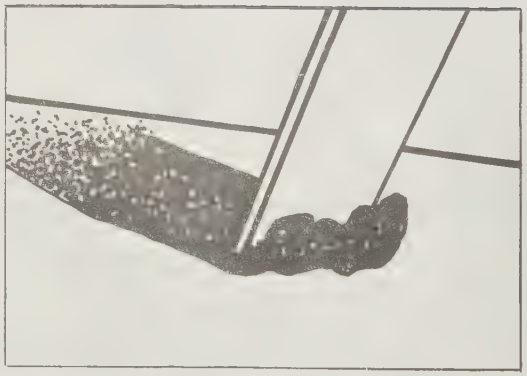
To prepare the plate for printing, finish bevelling the edges, to a 45° angle, smoothing any pits the acid made. Use the metal file in a shearing motion, and polish with metalite paper and 4/O emery. A clean, straight, neat, edge is most desirable, and is the mark of a professional print.

Correct any lines not desired on the plate, and polish corrected areas as mentioned in "Bitten Line". Unpolished areas will print grey, and detract from the artist's conception.

Prepare etching ink on the slab by mixing in a little linseed oil until it slowly drops off the spatula. Do not prepare more than is needed at one time.

Measure the paper allowing a 2" margin at the top and sides and more at bottom. Soak in a large tray of clean water. One may add a little alum or household ammonia to inhibit mold formation. Just before printing drain off surplus and place between blotters.

Warm plate on stove and then with a 3" or so square of matt-board apply ink to plate squeezing off surplus. Work it into the plate with a cork or a felt dauber (made by



Inking with piece of cardboard



Wiping the plate with tarlatan

tying rolled felt with string), being sure ink is in all the lines. Clean the dauber or cork with paper towel after use. The dauber may be stored in a jar of water to which a little alum has been added to inhibit mold. If you are using coloured etching ink, rub it in with the fingers. Coloured etching inks come in tubes, or dry pigments may be ground with plate oil and thinned with linseed oil, forming a puddle of colour on the slab.

When the ink has been rubbed into the bitten areas, wipe it off the surface with 12" square of tarlatan crumpled in a ball. Be careful to use tarlatan. Mosquito netting and other wiping materials are too soft and remove the ink from the lines. Use a dirty one at first, and end with a clean one. Wipe lightly, whisking tarlatan over surface of plate, leaving the ink in the lines but cleaning the surface. One may finish by wiping lightly with the side of the hand, and cleaning the bevelled edges with a small piece of paper towel. Whiting or calcium carbonate may be used for a very clean wipe. After hand wiping, dust the edge of the palm lightly with whiting and whisk it over the plate, renewing the whiting several times.

Cut a strip of stiff paper two inches wide. Place warmed plate, on the bed of the press, on some clean newsprint larger than the printing paper. Place a 2" strip alongside the plate. Put oilcloth on top of blotters to squeeze out excess moisture. Take the paper from the blotters, blot gently with a paper towel until no shiny areas remain when held to the light. Be careful not to scuff the damp surface. Place the paper over the plate, covering the 2" strip exactly, allowing about a 2" margin at the top and more at the bottom. All of this must be done with clean

hands. Either use gloves while inking, and then remove them before touching the paper or use holders of folded paper to handle the printing paper.

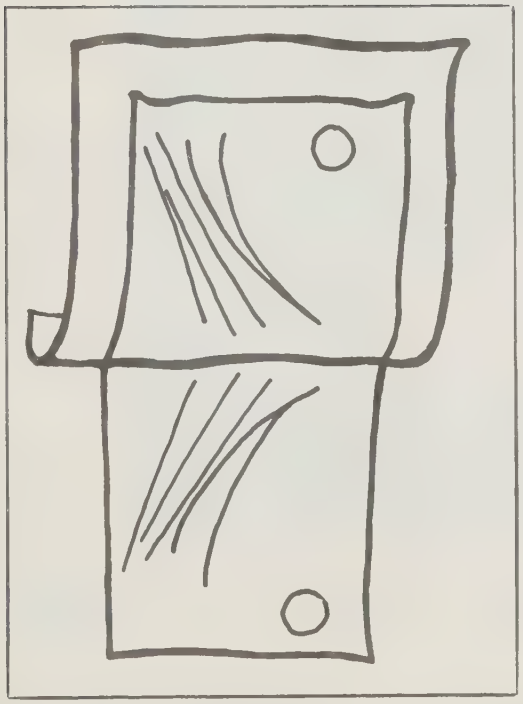
Place felts carefully over all without moving the paper. Roll evenly through the press until it is well through. Lift felts. Remove paper slowly. Place on flat surface to dry. Any small areas that missed the ink may be worked over with the etching needle.

You might also experiment with printing inks which are stickier than intaglio inks, or transparent printing ink mixed with oil colour. These are not good for linear work, but where there is bold relief etching, many colour combinations may be achieved. Colour may be rubbed into the etched areas using different colours for different areas. This may be controlled throughout an edition to some extent. And colour may also be rolled over the top with a perfectly straight hard rubber roller. Oily inks repel sticky inks and this knowledge may be applied to achieve definite colour separations. Very complicated and subtle prints may be made on plates on several different levels, by first using the fingers to ink the bottom areas, then using rollers of different degrees of hardness, a hard one for rolling on the top colour, and gradually softer ones for successive lower levels. This method was developed in France where there are better printing inks available.

Stencils may be made from the proof, and colour rolled through to either the plate or the printing paper with a composition roller.



Printing paper represented by dotted line with 2" strip alongside plate



The print is a mirror image of the plate

Two or more plates may be used for colour printing. One plate is usually the "key" plate, with the more decisive elements of the design, the others add depth and space and colour richness. The "key" plate may be printed first or last.

Pull the first proof. Set it aside in damp blotters or dry proof completely for one or two days. The blotters may absorb some of the colour and weaken the print. Ink the next plate. To register cut a piece of newsprint the size of the printing paper and place on the bed of the press. Draw the outline of the plate on this keeping the same margins as on the first proof. Place inked plate on outline, place first proof over, covering newsprint exactly, and run through the press.

There will sometimes be problems of inks repelling each other. It may be necessary to dry the first proof and re-wet before the next colour is printed.

Tremendous depth and luminescence may be obtained with colour printing, but it is too involved to go into deeply here.

## PROBLEMS IN PRINTING

Spotty inking resulting in white areas or lines which did not receive ink may be caused by:

— too dry paper
— too much wiping — soft wiping materials pull ink out of lines
— too little press pressure

— too few or thin felts
— cold plate

Blotchy print
— too much water in, or on paper

Bleeding
— ink seeping out of lines or inked areas
— too much or too thin ink

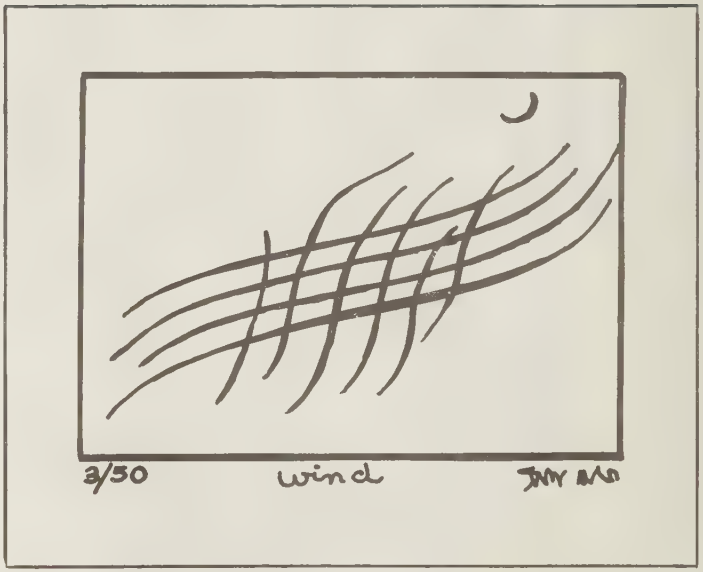
Paper sticking to plate
— ink too sticky — add linseed oil or warm plate and paper over hot-plate

Roller marks on print when inking plate with roller
— consistency of relief ink (too oily)
— rolling too hard
— marks may be caused by the edge of the roller intruding in the plate surface
— cigarette ashes
— whiting getting into lines

## NUMBERING THE EDITION

The first proofs, pulled before an edition is printed, are called artist's proofs. When the plate is completed, and the inking decided on, a few artist's proofs, numbered one, two, etc., may be pulled before the edition.

When the edition is to be printed, whether it is ten, or fifty prints, prepare enough paper and ink. Half the paper may be soaked and then stacked overnight, one wet, one dry, and wrapped in plastic. It may be used to print the




Numbering the edition


K. Murray Weber

next day. However, soaking it just before printing, and drying it as described in the text, seems to make a print of a much richer quality. However the stacked paper may be re-dampened just before printing.

Occasionally a plate will not last through an edition. Dry point is especially delicate, and aquatint, if not hardened commercially, will wear out fairly soon. This must be taken into account when planning the number of prints to be made.

If there are to be fifty prints, number the edition 1/50, 2/50, in the lower left-hand corner, as the prints come from the press. The title goes in the middle, and the artist's signature on the right-hand side under the print. If a print is spoiled it is destroyed and the next one should be numbered in its place.

In very complicated colour printing often only artist's proofs are pulled, since a uniform quality throughout the edition would be impossible. These are in the nature of monotypes, but no less valid. An edition should be as uniform as possible throughout, and all the same colour, but no two prints will be exactly the same. This is the charm of the artist's print as opposed to that of the commercial printmaker.

## SUMMARY

The same principles of art structure that govern other forms of drawing and painting also apply to printmaking. It is more than a formal design. It is a valid expression

in itself, and should be created from one's visual experience, and the result of one's living and thinking.

Line, shape, rhythm, and other principles of design enter into it. But there is more to it than that. Printmaking, more perhaps than any other medium, demands greater discipline on the part of the artist, but at the same time, the results of his work are often beyond his control. One is constantly defeated by the action of acid, ink, press pressure, even the weather outside affects what happens in the studio. The wise printmaker then, learns to give himself up, to some extent, to his medium, and use what results in the best way. This does not mean sloppy workmanship, but he should use, and try to control, what comes along.

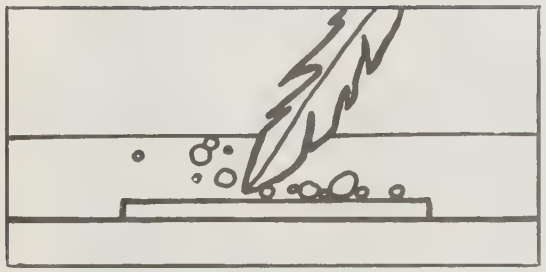
Printmaking is a contemporary medium of great versatility and great challenge. New inks, plastics, and other materials are constantly being discovered, and so are new ways to use them. The intaglio print still evolves.

Test plate, bitten line

Clean a zinc plate and coat it with hard ground. If the back is uncoated, paint with asphaltum varnish. Divide the plate into four quarters. Make similar haphazard lines in each quarter, some far apart, some close, and one section of each quarter cross-hatched. Use tools of different thicknesses, such as needles, nails, hard pencils. Place in an acid bath of one part nitric acid to nine parts water. Leave in for half an hour, or until a light bite has occurred. Test with a needle, or remove a small area of ground and peek. Stop out this if it needs more



Test plate, bitten line



**Removing the bubbles in a nitric acid bath**

biting. Time this bite. Stop out one quarter of the plate with varnish, allow to dry. Bite this for a similar length of time, and repeat this until there is only one square left unvarnished. Remove ground and print. On the proof, make notes of times of biting, and procedure. Be sure to keep this for reference.

Test plate, aquatint

Clean a zinc plate and dust it with resin making the dust thicker in some areas than others. Fuse to plate with heat. Stop out the back. With a water colour brush, paint a few areas with asphaltum varnish or resin dissolved in alcohol. (The latter is preferable for beginners because of its transparency. As biting occurs the changes in the plate may be compared with the stopped-out sections.) Place in an acid bath and bite until bubbles have collected for four minutes. Brush these away. Remove from the bath, make a mental note of the appearance of the bitten section, dry, stop out some more, and bite again for twice the previous time. Repeat this two or three times, doubling the bite each time. Remove resin and stop-out and print. Again note results in pencil on the proof, including the time of biting and acid strength and keep this for reference.

Test plate, soft ground

Apply soft ground to a zinc plate and stop out the back. Place several different scraps of material and other textures on the plate, tarlatan, burlap, plastic netting, string, etc., and run it through the press. Bite in acid bath, until the needle is caught in the bitten areas. Stop out some sections, bite again. Remove ground, re-apply, run through the press again with a piece of tarlatan, then

bite again. Stop out some more and bite again, until a rich and varied texture is built up on the plate. Then print and make notes.

Relief etching

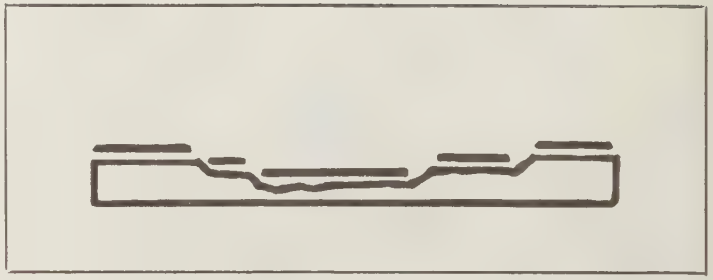
Stop out the back of a zinc plate. Stop out areas in front as well. Bite until a thin layer of metal has been removed. Take from the bath, wash, dry. Stop out more areas. Bite again, until another layer of metal has been removed. Repeat this once or twice more. Print by rubbing two or three intaglio colours into the different sections, and rolling over the top with a relief ink in a contrasting colour. On each proof, keep notes of inks used, consistencies, and problems encountered.

Engraving and dry point

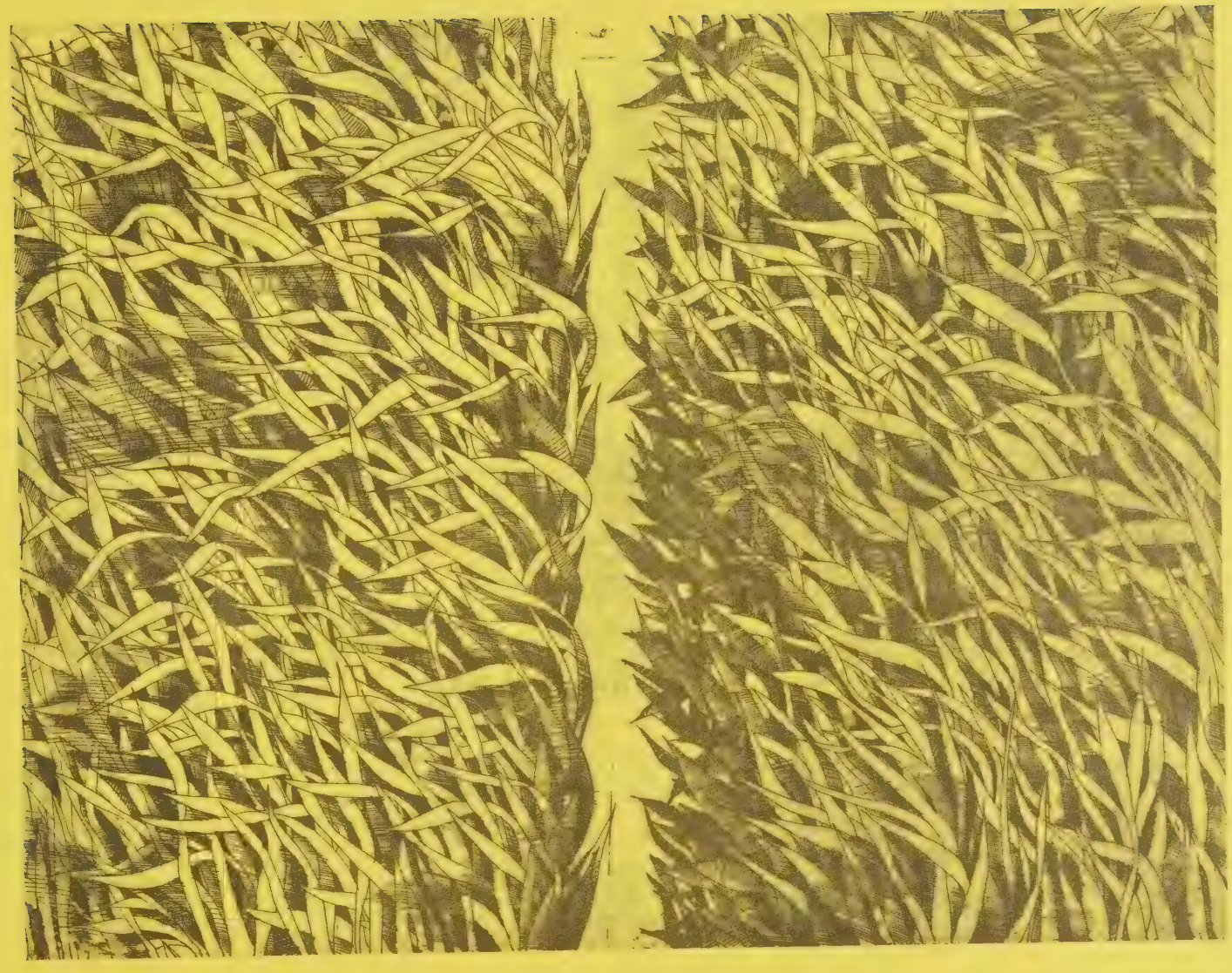
Divide the plate in two sections. Use the burin on the one side, the metal scriber on the other, using line first, then building up with textures to introduce a spatial quality. Experiment with different uses of each tool, varying the position of the scriber and so on. Ink and wipe the dry point side by hand. Wipe the engraved section cleanly. Print and make notes.

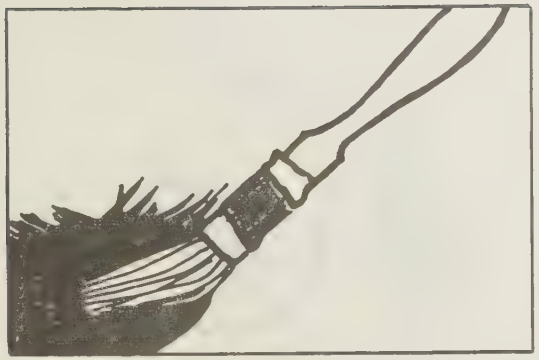
## PRESS PRESSURE

To adjust the pressure of the printing press, place a plate of the same gauge as the one to be printed on the bed of the press with printing paper over it. Screw pressure down firmly. Run through a couple of times. If the pressure is adequate, there will be a firm plate mark on the paper.



Cross section of relief-etched plate with ink deposited on different levels





Applying hard ground

## APPENDIX

Hard ground:
(from "Printmaking", by Gabor Peterdi, Macmillan, New York)
2 parts asphaltum, by weight
2 parts yellow beeswax, by weight
1 part resin (lump), by weight
benzine

Make in well-ventilated area. Put crushed resin in an old double boiler, with enough benzine to cover. Place over hot water on hot-plate, on low heat and melt. Add beeswax, chopped with enough benzine to cover again, then melt. Add asphaltum and stir until smooth. Add benzine until cooled mixture is thin enough to paint on the plate. Strain through cheesecloth. Paint some on a warm test plate. If, when the etching needle is drawn through, the line is uneven and cracks, add more beeswax. If it is soft and smears add more resin. Varsol is the solvent.

Resin stop-out:
Add resin to alcohol until no more will dissolve. Alcohol is the solvent.

Soft ground:
Two parts hard ground to one part vaseline.

Asphaltum varnish:
It is better to buy it commercially from the photo-engraver's, but it may be made by dissolving powdered asphaltum in Varsol.

## EXPERIMENTS FOR BEGINNERS

Problem 1

After each of these methods has been explored, a design problem may be set in one technique. For instance, a simple design combining straight and cross-hatched lines. Bite, print, and then apply aquatint, biting and stopping out, incorporating with the design.

Problem 2

Again use line and cross-hatching. Bite. Apply some texture by running a plate prepared with a soft ground, (see page 14), through the press with a textile or other material. Stop out areas desired. Bite. Re-apply texture, bite again, until a rich texture is built up, always remember to keep it in unity with the initial idea.



Problem 3

Make a drawing on the plate. Using a burin, cut into the plate first with line, then build in textures of different little shapes. Print and rework plate until a satisfying result is obtained.

Problem 4

This is the same as above only using a dry point tool.

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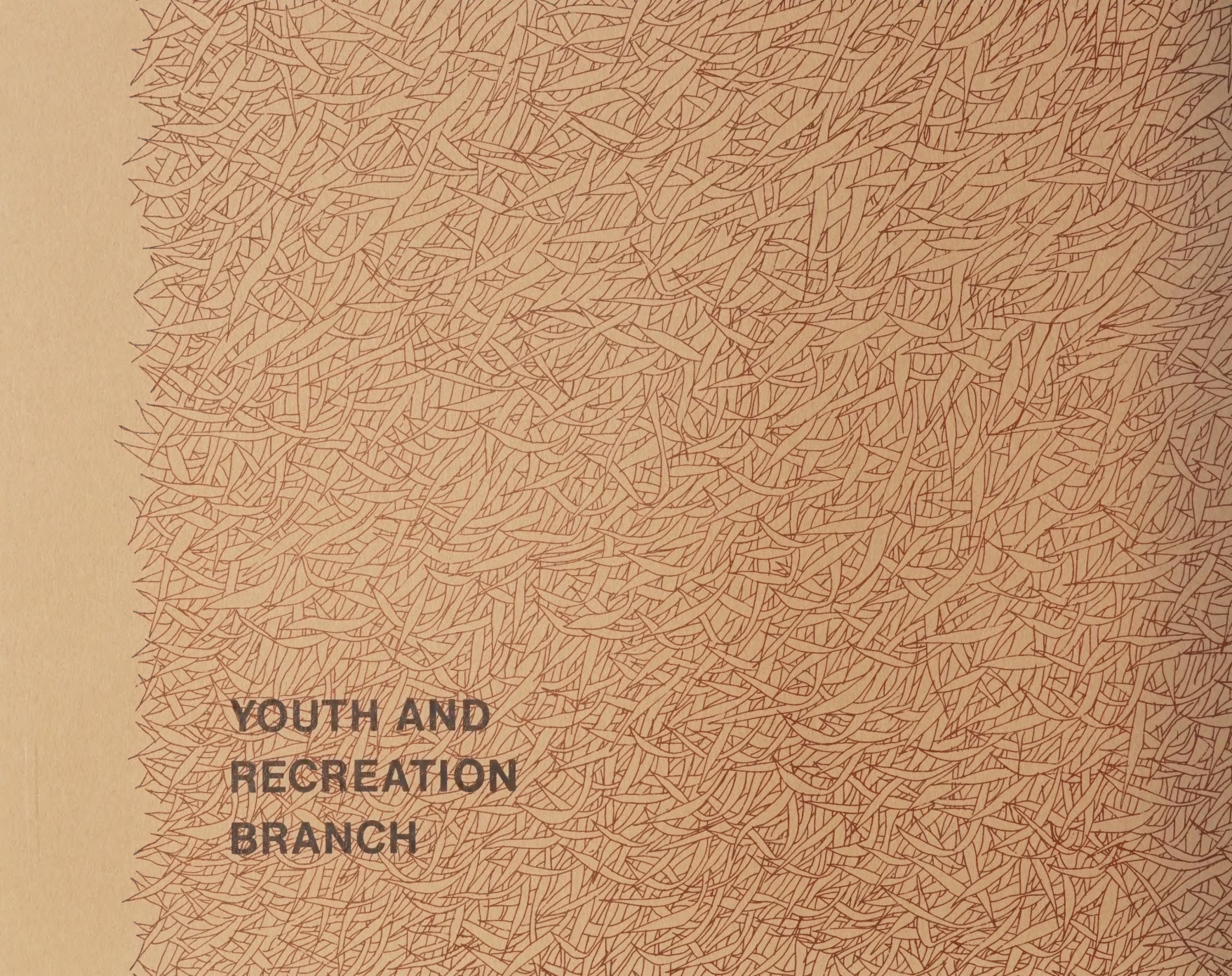
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